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Trails that Teach

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Forest recreation management guide

Cooperative Extension Service Purdue University Lafayette, Indiana

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Hiking for pleasure is high on the list of favorite recreation activities. Trails can inform and teach the recreating public and make recreational experiences more valuable. But, inviting, well-maintained trails are scarce in Indiana, and there is a growing need for new ones statewide.

Interpretive nature trails for hikers are valuable elements of any recreational or educational property. If introduced to an area through an interpreted trail, users learn to appreciate its natural resources and beauties. Studies show also that those who understand an area will take care of it, thus reducing maintenance costs and vandalism.

Most important however, is the enhancement of the recreation and educational experience, thus making users more ecologically sensitive and understanding.

This booklet describes how to build and maintain an interpretive trail—a trail that will teach. The physical features are covered first, emphasizing planning and construction. Then, interpretive procedures and information; and finally, maintenance methods are presented.

The trail

An interpretative trail is more than a path connecting two points (Fig. 1). It includes the pathway, or tread, the surrounding scenery and the interpretive devices along the path. Thus, the path becomes a guide **to** the forest or natural area, rather than a way **through** it.

The recreation trail leads the walker to points of interest within the area, while the interpretation acquaints the visitor with the natural scene, serving as his pointer. Many visitors can see the forest only as a mass of trees, but their interest and perception can be heightened by making them familiar with the details of nature—by helping them see and recognize the drama in any natural environment.

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Figure 1 A teaching trail through second growth forest

Physical Development

The trail must be constructed so that the user may enjoy the scenery. An interpretive trail should not be an obstacle course designed only for the very young, as elderly people will also be enthusiastic users of a well-designed trail.

The trail should enter and exit the property at the same place, for the convenience of the users. There should be only one entrance, and any side trails should return to the main trail. The main trail should be in a general loop form, avoiding a return over the same route as entry, for most of the trip. However, topography and property ownerships will dictate exceptions to this.

After the planning process is complete, and drawn routes have been checked in the field and revised, the trail route should be clearly marked before construction begins. Marking may be accomplished by flagging, staking or stringing. Flagging with high-visibility ribbon is best used in dense vegetation, while a single strand of string can give a general idea of the path in more open areas. Stakes are used to precisely mark curves, intersections and inclines, especially on steep slopes.

Construction

Construction of a long-lasting, easily-maintained trail is fairly simple, if these specifications and procedures are followed.

1. The tread must be at least two feet wide and clear of obstructions. It should be firm, smooth and have a slight outward slope to provide good drainage and limit erosion as much as possible. In level terrain, the tread may be simply constructed by scalping the ground to remove vegetation and surface roots. A good trampling by a group of 30 people will give it a permanent look. Fig. 2 illustrates a good tread for hiking.

Many times a trail must be constructed on a hillside. Excavated material taken from the slope may be used to build up the outside. Such a trail should have a tread wider than two feet, to allow

for excess wear on the outside. The fill should be solidly packed or a wider cut will be needed. Typical situations are shown in Figure 3.

Wet areas present special problems, so avoid them if possible. To make the tread solid, the trail must be raised above the wet area or the water must be drained away from the trail. Various devices, such as the railroad ties in Figure 4, can be used, with a drainage pipe under them. In some areas, the tread can be built up with extra dirt and fill material. Drainage ditches parallel to the trail carry away the water. So they do not act as a collection area for ground water these ditches must be on an incline. A path cover of gravel, wood chips or sawdust provides solid footing and reduces erosion.

2. The grade should not be greater than ten to fifteen percent. A steeper trail is tiring for the hiker and invites erosion problems. However, if conditions warrant, short sections may be greater than this limit. Rustic steps may be desirable (Fig. 5).

3. Water drainage must be provided and controlled. In some areas, a gentle outward slope on the trail is not adequate for limiting water erosion. In these areas, a water bar helps reduce the problem. Examples of water bars are shown in Figure 6, while figures 7 and 8 illustrate a problem with water erosion.

4. Vegetation should be cleared from three feet on either side of the trail center and seven feet overhead. Take special caution to remove poison ivy, briars and nettles from the trail side. It is also important to cover or remove exposed tree roots to reduce hazards. Figure 9 illustrates a partially exposed root system which should be removed to prevent injuries. The exposed cut on the remaining roots should then be painted with tar or pitch to prevent disease organisms from entering the tree.

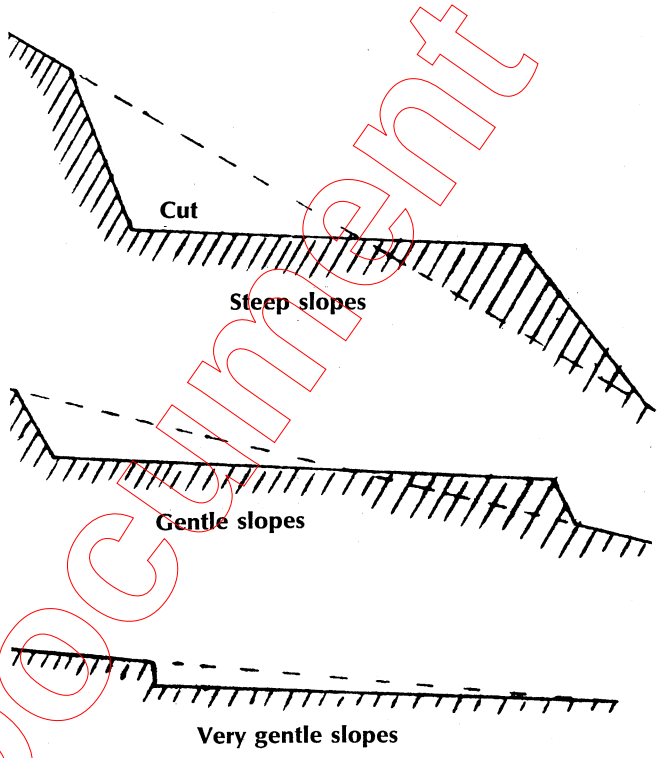

Figure 3 Cuts needed for trail construction on slopes

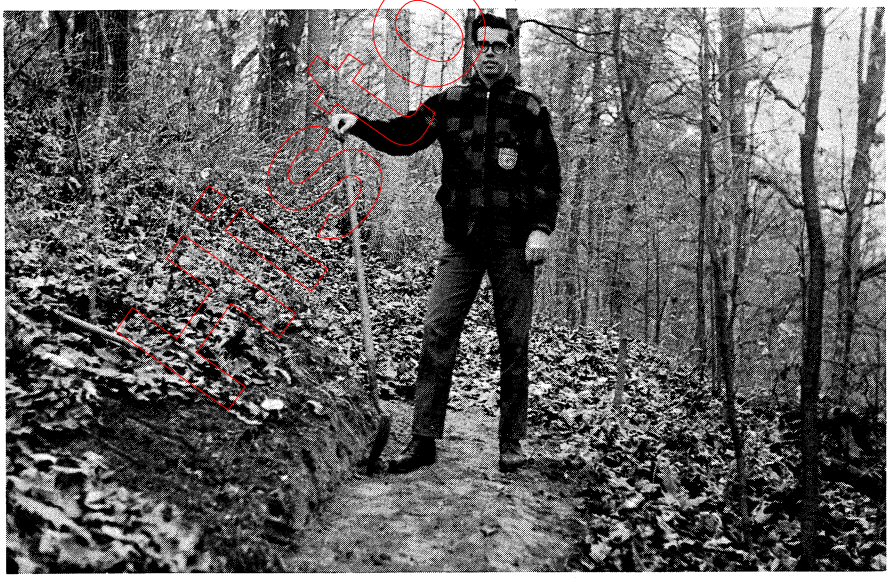

Figure 2 Tread of a hiking trail on a gentle slope

Figure 4 Railroad ties serve as tread over a wet area

Interpretative Development

Interpretation of the nature trail is an integral part of any good trail system. It makes the trail more versatile and useful to all who use it, and the trail then becomes an educational tool. Interpretation also serves to help people appreciate their natural surroundings and adjacent features.

Theme

Interpretive trails can tell a story or theme, describe a variety of features, or identify specimens. One good arrangement is in a main trail which illustrates many aspects of nature. Side loops may elaborate on special topics; tree names, plant ecology, flower and herb identification, soil and water relations, wildlife homes, geology or local history.

In a school forest the loops may be keyed to study exercises, programs of land management or land use policy, and all stops should relate to the unified theme or purpose. The general trail thus provides an introduction to the entire natural history of the area, while the specialized loops can offer greater depth in individual subjects.

Selection of features

In his selection of sites the interpreter should thoroughly cover the trail. The sites should be scattered along the trail, though even spacing is neither necessary nor desirable. The interpreter should try to achieve a comfortable spacing and provide effective, connected interpretation. A one-half mile loop should contain from 10 to 20 principal interpretive stops. Bear in mind that the most spectacular features are not always the best ones, since insignificant-looking plants can often provide a more interesting story than a large tree. Rare or unique specimens which greatly enrich interpretation must be protected. A versatile interpretation program might also include seasonal features, such as spring flowers or fall seeds. However, this demands regular attention to keeping signs in season.

Interpretive aids

Self-guiding trails are the most practical for general public use on an un-organized visiting schedule. This type of trail allows the visitor to walk the trail without a trained guide to explain its features. Guidebooks, signs or audio tape players are used to help the hiker enjoy his walk. The same trail may also be used for tours led by school teachers, scout leaders or private guides.

Each trail should have a clear map of its route available for visitors. The interpretive map should be different from the base map, in that it should emphasize the trails and some special features. A sufficient quantity should be available at the head for visitors to carry with them. An alternative method is to make several large maps, displaying them at the start and at points along the trail.

Keyed guidebooks

The simplest and most economical aids are guidebooks keyed to points marked along the trail, which are usually dispensed at the beginning of the trail. The text should be keyed to trail markers. The major expense of this aid is in preparation and printing. The U. S. Forest Service successfully asks that the booklets be returned upon completion of the trail, or that a dime be deposited to defray expenses. Other areas offer guidebooks at no charge. The booklet which is taken home does serve as an advertisement and a continuing source of information. Problems in maintaining an adequate supply of booklets may be encountered with this method. Maintenance costs are also slightly increased when leaflets are discarded on the trail. Another disadvantage is that once the guidebook is printed, the interpretive pattern is fixed, unless signs and guided tours are used as supplements.

In-place signs

An explanation or interpretation of selected features may be included on signs located at the sites. The signs should be carefully and durably made, and special care should be taken to avoid gaudy signs; use simple, natural, blending colors and shapes that harmonize with the forest environment. They may be keyed to maps or guidebooks on self-guiding trails. There are disadvantages in using signs in that they increase chances of vandalism; require larger investments for installation, maintenance, and replacement; and they lack the take-home value offered by maps and pamphlets.

Audio tapes

Portable audio-tape units are useful, but expensive, interpretation aids. However, with the development of cassette recorders, a relatively inexpensive aid may be made available. A tape which the user starts and stops as he moves from point to point is most practical. Earphones help to limit interruptions for other hikers. Bear in mind, though, that problems may be expected in repairing damaged recorders, replacing worn-out tapes and replacing recorders. These units are the most flexible means for interpreting a trail, since erasing and remaking the tapes is all that is required. The audio tape unit is most useful for special learning projects in school programs.

Guided tours

Guided tours may be used as a supplement to self-guiding nature trails. They are useful for certain organized groups, when an able leader makes them effective, but large groups often encounter difficulties in enabling all to hear and see the interpreter. Further, not everyone moves at the same pace,

Figure 5 Small logs and stakes make steps to reduce erosion on steep sections

so some people will not see enough of the trail, while others will be bored. Effective use of tours requires that a competent guide be available and that the group be small and share a common interest. The school class is often benefitted greatly by well-planned guided tours.

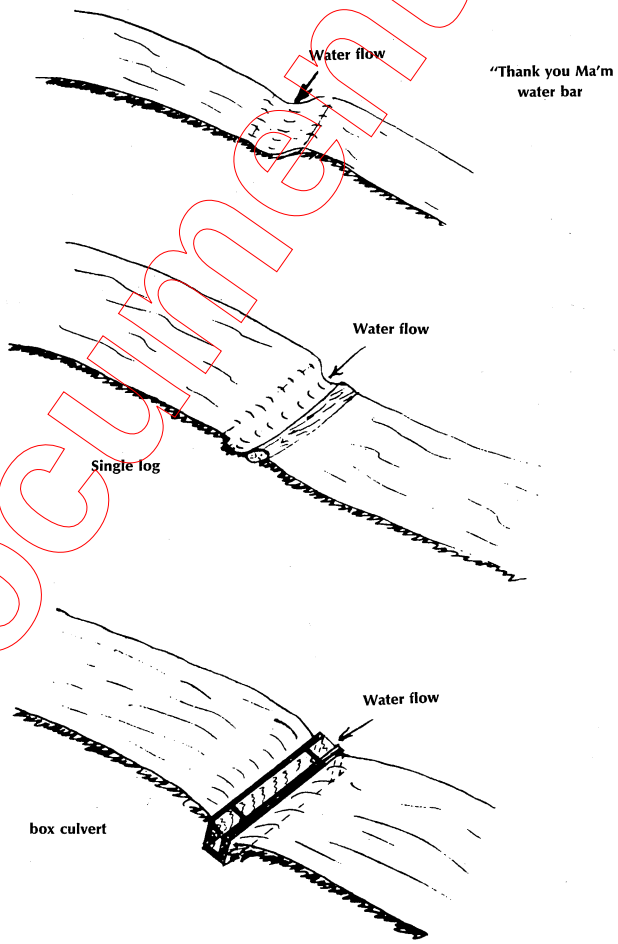

Figure 6 Water bars

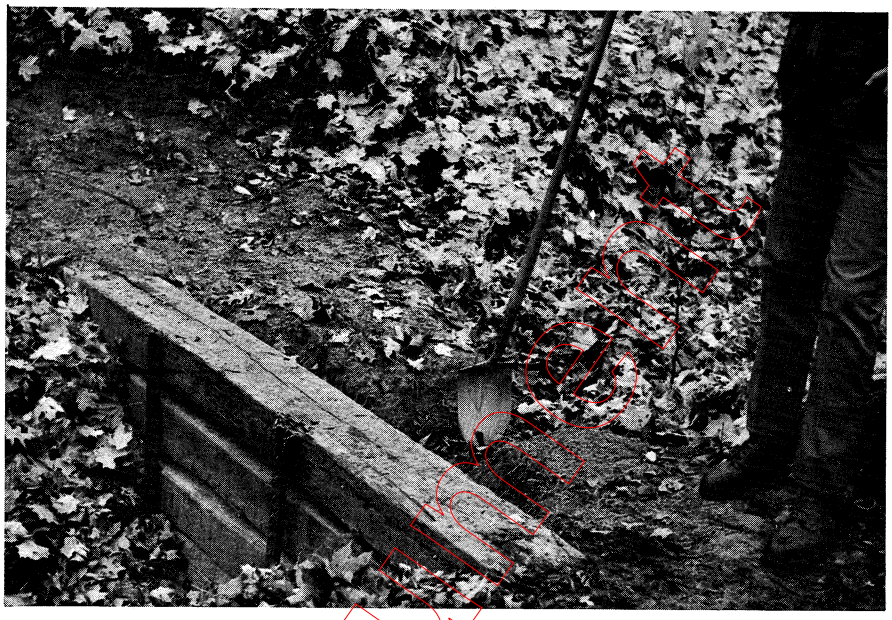

Figure 7 Water erosion has created a channel through the trail, requiring a check dam

Trail Maintenance

The work involved in a trails system does not end with the construction and development of interpretive devices. The trail must be maintained for the safety and enjoyment of the user. Directional and interpretive signs must be kept in good shape and replaced to prevent confusion. Prompt and thorough maintenance and cleanup will also inspire a more careful attitude from the public.

Some of the maintenance problems include erosion, vegetation and vandalism. Much of the maintenance work will be the prevention of damage or dangers; but the rest will be corrective.

Condition surveys to determine maintenance needs should be made each year by the person in charge of the trail. Surveys at the start and the end of the recreation season will usually be adequate, except for inspections after severe storms or heavy rains.

Erosion control

Erosion control is a major maintenance problem in most hilly areas. For reasons of safety, appearance and cost of long-run damage, trail erosion from water and loose soil must be halted as soon as possible.

In areas of heavy run-off, water bars should be maintained in top condition. Check dams and other water run-off barriers should have silt build-up removed and damage repaired. Figures 8 and 9 show a check dam which serves as part of the tread. Spring rains washed the fill material under the dam and started a channel in the tread. This problem could have been lessened with an active maintenance program.

Figure 8 Advanced state of erosion, where water has washed the fill material under the check dam

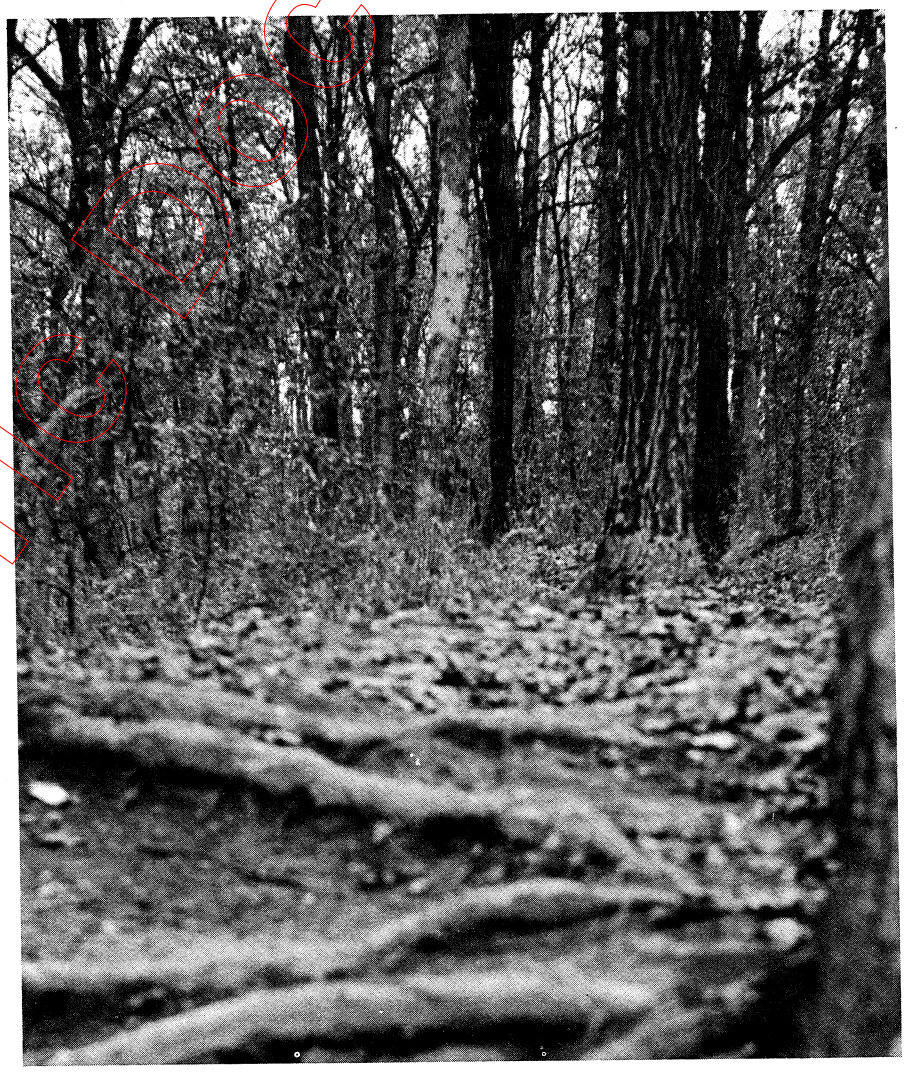

Figure 9 Exposed tree roots along the trail present a hazard to hikers

Trail planning and layout

First, study the natural features. Do not send in a crew to "clean up" or "brush out" a trail until the area has been carefully studied, the plants, rocks and wildlife have been noted. Precipitate development may cause loss of valuable features.

The five functions of the planning stage are: 1) surveying the site, 2) mapping the area, 3) determining the length of each trail, 4) marking the route and 5) constructing the trail.

Careful planning will reduce problems associated with other steps in the development process, since special problem areas will be noted before construction, and outstanding features will be highlighted.

Surveying the area

General reconnaissance is the first planning stage. Survey the site for special features, vegetative cover, drainage, topography and soil conditions. A sketch map showing the approximate locations of these elements is useful as a record of the general overview. The survey methods include: walking through the area, making notes, sketches and photographs; studying aerial photographs for vegetative cover, drainage and steep terrain (available from the Soil Conservation Service); and sampling soil from potential problem areas.

Mapping the area

The sketch map information from the reconnaissance should be transferred to a scale topographic map. If a well-prepared map is not available, the planner should either make one or borrow from other maps. A good source is the U.S. Geological Survey regional quadrangle map which is available from the Department of Natural Resources, Indianapolis. Soil survey maps, maps of adjoining properties and aerial photographs might also be useful.

Determining trail length

For casual visitors and most school classes, an interpretive trail should require 30-60 minutes, including stops, to cover, and be one-half to one mile long. Side loops off the main trail can add extra length and interest. Specialized trails for children and handicapped persons should usually be quite short.

Selecting the route

Using the contour map, with reconnaissance information drawn in, and with interpretive features selected, the trail can be located on a transparent overlay of tracing paper or acetate.

All major attractions should be accessible from the trails, or visitors will make their own disorganized paths to reach them.

Where possible, take advantage of old railroad beds, wagon roads or logging roads as trails. Keep overlapping of trails which have the same or similar views to a minimum. To reduce short-cutting and confusion, one trail should not be visible from another. Likewise, switchbacks should be avoided when practical.

A trail is most interesting if it has a curving pattern, so that the view is changing. However, if the trail is obviously not going anywhere fast, walkers will short-cut it, eliminating excessive twists and turns. Gentle ups and downs are more interesting

Figure 10 Rock pathways across shallow streams are easy to build and repair

Figure 11 A natural leaf mulch protects the trail in winter and is incorporated into the tread in spring

than a flat walk. The shape of the land will often dictate the shape of the trail. Follow ridges and valleys; ease up the sides of long slopes; and keep away from muddy bottoms and dangerous cliffs.

Rock bridges, which are popular and economical for crossing small streams (Fig. 10) are subject to continual erosion by the water. Small filler rocks need to be replaced frequently, and even larger rocks must be replaced from time to time.

When loose soil on the upper cut of a hillside falls onto the tread, the trail becomes difficult to travel. This fallen soil can be used to build up the outside of the trail.

Covering the tread with wood chips, sawdust or some similar natural material will protect the trail from many erosion problems. The leaf-fall in hardwood forests will also act as a protector. A wood chip mulch will last about one year under normal conditions, but less in moist sites. Figure 11 illustrates natural vegetation cover, which protects the trail in winter.

Vegetation control

An annual pruning of intruding vegetation will usually be adequate to keep the trail clear. In areas of heavy growth of nettles or other noxious weeds, an herbicide may be useful to keep spring and early summer growth down.

A major vegetation problem is downed trees, which should be removed as soon as possible. But only the sections which impede traffic need to be removed. Thick logs can be sawed into sections to be used as benches at the side of the trail.

Vandalism control

Vandalism cannot be completely avoided on public or private recreation areas. However, it can be reduced if evidence of damage is masked or re-

moved. Studies have shown that evidence of past vandalism invites further damage. Apparently, people seem to respect property not vandalized, but are willing to further scar that which is already degraded.

Beech trees seem to be a favorite target for vandalism. Carving shows up plainly on the smooth bark, which satisfies certain second-rate artists. To relieve this problem, scarred areas should be painted with a dull gray or black paint.

Model nature trails and centers

Visiting existing nature trails and centers will provide many good ideas and guides for establishing trails. This list includes the names and location of several nature trails and centers.

Aullwood Audubon Center
1000 Aullwood Road
Dayton, Ohio 45414

Located north of I-70 near Ohio 48 exit, this center has self-guiding nature trails and exhibits for adults and children. Group tours are available by arrangement.

Westwood Trails
Dept. of Forestry and Conservation
Purdue University
Lafayette, Indiana 47907

Located at the west edge of the Purdue campus, this trail system contains a general nature trail, an ecology trail, and a timber management trail. The trails are self-guiding, though group tours are available by arrangement. The trails are designed for all ages.

Bradford Woods
Martinsville, Indiana 46151

These trails emphasize identification of tree species, and were designed primarily for guided camp groups of children.

Lincoln Boyhood Home Nat'l. Hist. Memorial
U.S. National Park Service Dept. Interior
Lincoln City, Indiana 47552

This is a self-guiding trail for all ages, and it is interpreted for its historic value.

Hoosier 4-H Leadership Center
R. R. 9
West Lafayette, Indiana 47906

The Center contains a system of self-guiding nature trails and hiking trails designed to provide aesthetic appreciation of nature and pleasant leisure hiking for youth and adults. Guided tours are available for groups on request.

Trail information sources:

The American Museum of Natural History
77th Street and Central Park West
New York, New York 10023

The National Park Service
Interior Building
Washington, D.C. 20025

Division of Indiana State Parks
Department of Natural Resources
State Office Building
Indianapolis, Indiana 46204

The U. S. Forest Service
633 W. Wisconsin
Milwaukee, Wisconsin 53203

National Audubon Society
Nature Centers Division
1130 Fifth Avenue
New York, New York 10028

County Extension Agents
Cooperative Extension Service

Dept. of Forestry and Conservation
Purdue University
Lafayette, Indiana 47907

Forest Recreation Management Guides offer information from research and development work in all phases of outdoor recreation. Guides are prepared for commercial outdoor recreation area operators, school nature center supervisors, officers of clubs with recreation land and public servants. Suggestions of topics which you would like to have covered can be sent to the Extension Forester, Purdue University, Lafayette, Indiana 47907.

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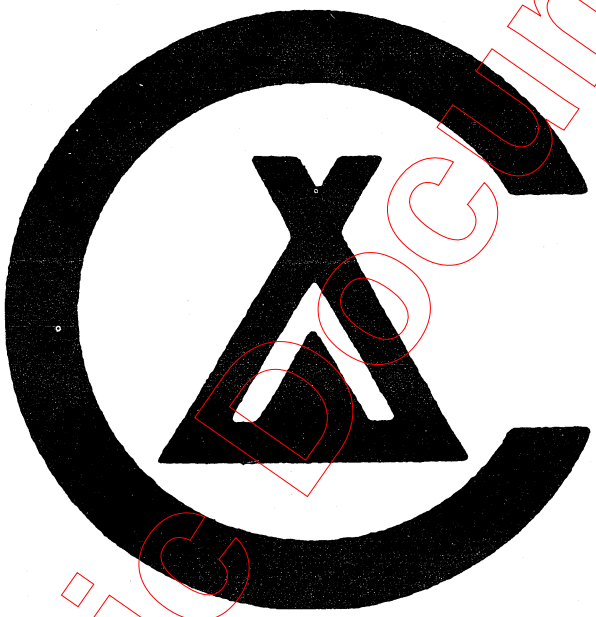

The tepee-shaped symbol on the cover represents outdoor recreation. It is a portion of the international campground symbol, used as the standard identification of recreation areas in many foreign countries and, increasingly in the U.S.A. The symbol is used on official European road signs to guide visitors to public and commercial campgrounds.